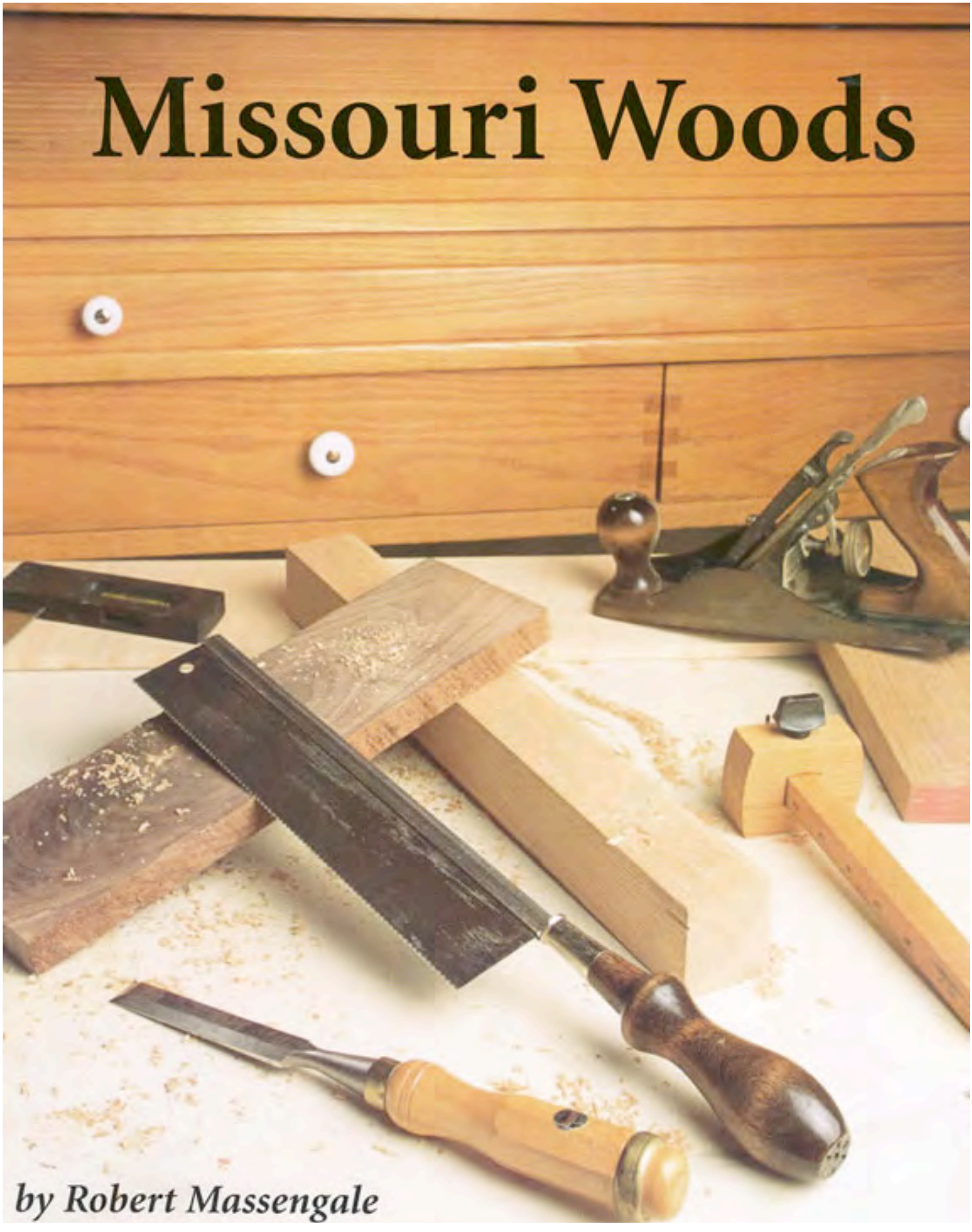
Missouri Woods



by Robert Massengale

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INTRODUCTION

Missouri is located on the western edge of the Central Hardwood Region of the United States. As a result, it has many species of trees native to that region as well as a few northern and southern species, too. Most of the timber in Missouri is in the southeastern one-third of the state. While oak and hickory are predominant species on the uplands, cottonwood, elm and soft maple are the major bottomland species. Shortleaf pine is the only native pine in the state.

It has been estimated that Missouri had over 30 million acres of forest land at the time of the first settlement. By 1986, this figure had dropped to about 11.5 million acres. The primary cause for this reduction has been land clearing for agricultural crops.

Forest lands, as opposed to agricultural lands, may be considered as either commercial or non-commercial. Commercial forest land is that which is producing, or is capable of producing, crops of industrial wood and so is not withdrawn from timber utilization by statute or administrative regulation. Noncommercial forest land includes glades and bare rock sites as well as reserved forest lands; this amounts to about 150,000 acres within the state. Currently, about 82 percent of Missouri's commercial forest land is in private ownership, with 12 percent owned by the federal government and 6 percent by state and other entities.

Much land north of the Missouri River, with the exception of steep river hills, is under cultivation. The forests of this area are generally more scattered and in smaller blocks and strips. Some of the highest quality walnut, white oak and soft maple are found in this area. South of the river, the oak-hickory forests predominate with a scattering of pine in the south central and eastern Ozarks.

This publication has been prepared to help identify the major commercial wood species, or species groups, native to the state. It does not deal with the many smaller trees and shrubs which, though interesting, are not generally harvested for commercial purposes. Several groups, such as the oaks and hickories, are lumped together because no separation is made by the industry. Indeed, in many cases it is not possible to separate the woods without laboratory equipment or botanical materials from the tree. Other references are available to assist in exact identification of species if you are interested. Several species are included which have only limited markets, but will occasionally be found on a log deck at a sawmill, and which you may want to correctly identify. The red and black oaks as well as white oaks are lumped together in groups, as is the practice in the lumber industry.

The woods are listed in alphabetical order according to their common or popular names. Along with the common name is listed the scientific (Latin) name of the species, or of the most common species in a group. Some industries are quite selective when it comes to timber species. An example of this would be the white oak whiskey barrel industry which probably uses 96 percent white oak (*Quercus alba* L.), simply because many other white oak species are just not satisfactory for barrel manufacturing. Otherwise, the red and black oaks are generally lumped together in the trade and cannot be distinguished from each other in use. At the end of this publication is a glossary of terms used.

WOOD IDENTIFICATION

Wood is the oldest material used by man and yet is also one of the most modern. Even with the new materials being developed through science, wood still serves uncounted needs of man and will continue to do so. A basic ability to recognize different types will add to your enjoyment and use of woods. The purpose of this book is not to make everyone a wood technologist, but to point out simple differences that separate the common species in Missouri.

Throughout the species descriptions, I will mention several criteria useful for identification, such as the range of the tree in the state, its general habitat and associated species, and sometimes the general size or shape of the tree. The bark is generally described as an additional feature used for identification. Also noted are the colors of sapwood and heartwood, characteristics of the wood relevant to its use, and its durability if significant, and descriptions of the growth rings and cell arrangement.

Mention is also made of some of the past and present common uses of wood as well as comments about its desirability as a raw material for use in home workshops.

Wood is an organic material composed of cells. The cells are elongated, hollow, and generally oriented either up and down the tree length, or from the center of the tree out to the bark. Because of

these orientations, woods are best studied in one or more planes (*see illustration*). The most common plane is cross-section, or the view of the stump or trunk as the tree is felled. This is also how the growth or annual rings are most easily seen. The radial plane, or the view from the center of the tree out to the bark may also be helpful. The ray tissue is apparent on this plane. Rays may be wide or narrow and provide a distinctive fleck in some woods that can be a good identifying characteristic. While less useful in identifying a wood, the tangential plane exhibits the grain of the wood, as it is the view tangential to the growth rings of the tree.

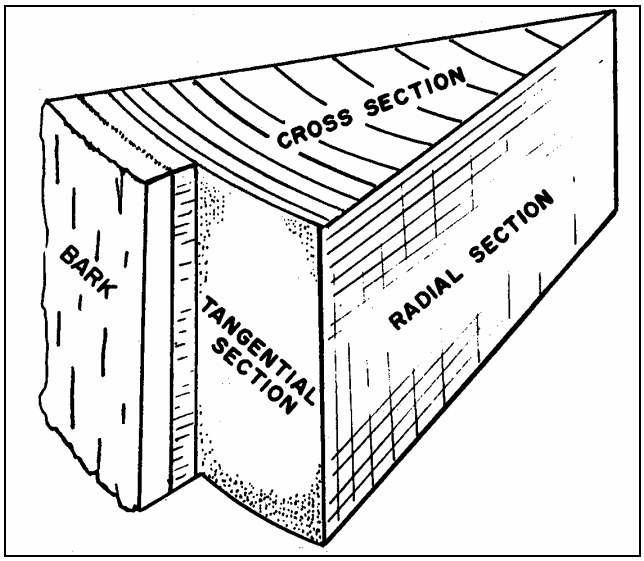

Fig 1: Woods are studied from the cross-section, the radial section or the tangential section of a tree. On the cross-section, cell arrangement, size and location are the best guides to identifying many woods. The rays on the radial section can also be a good identifying characteristic.

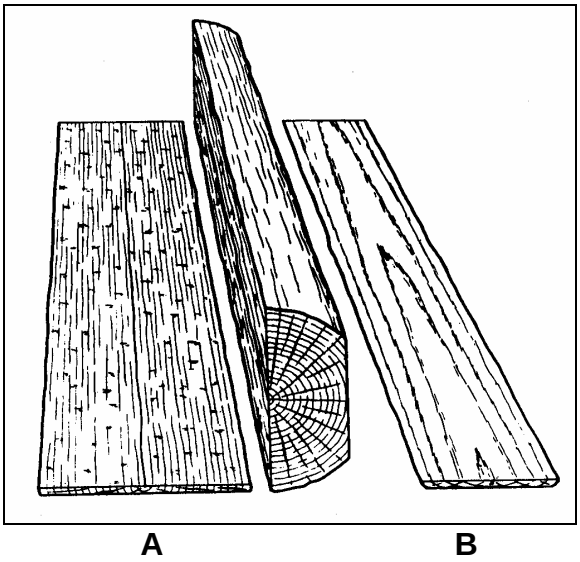

*Fig 2: Lumber can be cut from a log in two distinct ways: radially to the rings, producing "quarter sawn" lumber (A), and tangential to the annual rings, producing "plain-sawn" lumber (B). (Courtesy, **Wood Handbook**, USDA Agricultural Handbook #72, USFPL, U.S. Forest Service.)*

Even though most cells are microscopic, many can be seen by the naked eye on the cross-section of a piece of wood. Their details of arrangement can frequently be seen with the help of a sharp pocket knife or razor blade and a 10-power hand lens. Cell arrangement, size and location as seen on a cross-section are the best guides to separating most common woods. The cells, of which there are many types, combine to become tissues, and these tissues become wood as we observe it. Cells and tissues are both useful in identifying woods.

Throughout the species descriptions I have mentioned several criteria useful for identification. You will note the mention of a substance called "tylosis" in some woods. Tylosis is a clear, plastic-like material that appears in pores and cells and blocks the flow of liquids. It appears infrequently enough to be a useful identifying feature.

HARDWOODS AND SOFTWOODS

Everyone has heard the terms "hardwood" and "softwood." Botanically, the hardwoods are Angiosperms, or the species classified as broadleaved trees. Softwoods, then, are Gymnosperms, the species classified as conifers, which are usually cone-bearing trees. It is important to remember, however, that the term hardwood or softwood is not a reliable guide to the wood itself. The hardwoods, with a few exceptions, lose their leaves in the fall or during the winter. Softwoods generally have needle-

like leaves that remain on the tree throughout the year. There are only four softwoods native to Missouri, although many other species have been planted.

Each of our native species is different enough to have identifying characteristics to distinguish it from all others. It will be most helpful, as you begin, to determine first of all if the wood you wish to identify is a native species. Your source of the wood, or other factors will help you decide this. Leaves, bark, or the fruit will also be useful to you if they are available.

All trees that grow in Missouri exhibit annual or growth rings, though some are more distinct than others. Cells and growth rings are most clearly seen on the cross-section of the wood if clean cut with a sharp knife, and the use of a hand lens will help distinguish the wood's characteristics.

Annual growth rings may, in some cases, be good identifying features. Growth rings are generally divided into springwood (early wood) and summerwood (late wood), although it may not be readily apparent where one ends and the other begins. Springwood consists of the larger cells produced first in the spring, while summerwood (the later and smaller cells) follows until the tree becomes dormant in the fall. In some softwoods, there appear to be color differences between springwood and summerwood. This is because the transition from springwood to summerwood is abrupt. Other species have no apparent color difference and have a gradual transition (*See Figure 3*.).

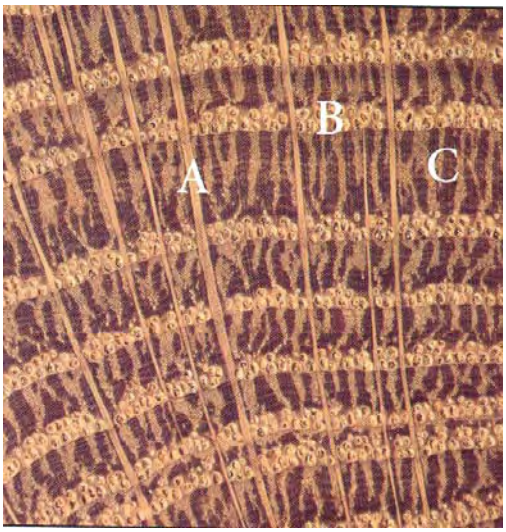

Fig 3: This microphotograph of a cross-section of the white oak clearly shows the linear wood rays (A), the large springwood pore (B), and the finer summerwood pores (C). Annual rings, formed by the springwood pores, are clearly shown.

Another identifying characteristic is pores. Hardwoods have them, softwoods do not. Pores are the large cells in hardwoods which transport water and dissolved materials. Often the pores will be quite large in the springwood area and decrease either abruptly or gradually in size into the summerwood. The abrupt transition from large thin-walled pores in the springwood to smaller thick-walled cells in the summerwood is often clearly seen, and this feature defines the wood as being "ring porous." Oak is a good example of a ring porous wood. On the other hand, if the large pores are dispersed evenly throughout both the springwood and summerwood, the wood is then defined as being "diffuse porous," even though you may clearly see the annual rings; a good example of this is maple.

Color and odor can also be used to identify common woods in Missouri. Black walnut, for example, has a distinct color unlike other native woods. Sassafras has a unique spicy fragrance that quickly identifies it. Odor and color should be used with some caution however. Odor tends to fade over time and one needs to be familiar with the odor before attempting to identify the wood in question.

Color also changes over time and may vary between boards, between sapwood and heartwood, and after extended exposure to sunlight. Sometimes only a fresh cut on the wood will expose the true

odor and color. Generally speaking, the sapwood or outer portion of the tree has no distinct odor. Heartwood usually has the characteristic odor and color which may be useful in identification.

Texture and grain, weight and hardness are helpful identifiers, but may be more useful if you have other samples of woods, either known or unknown to compare with. However, these characteristics will be consistent in the species and knowing the features for a particular species may be helpful to you.

All of the identifying features mentioned for each of the species should be used together in determining which wood you have, because there are enough variations between trees and sites to make identification by one feature alone somewhat limiting. Two, three, or even four matching characteristics will give you a more accurate guide.

The weight of wood is affected primarily by two factors: the density (measured as specific gravity) and the moisture content (usually expressed as a percent of oven dry weight of the wood). The specific gravity of wood is the ration of the density of the wood to density of water at a specified temperature (usually 4 degrees Centigrade). Because moisture in wood varies, specific gravity is usually based on the oven dry weight. In the chart of Comparative Statistics for Missouri Woods, the moisture content is assumed to be 12 percent.

The moisture content of different woods varies greatly and will even vary between trees of the same species and between different parts of the same tree. When both the cell walls and the cell cavities in wood contain moisture, the wood is said to be “green.” At the point where no moisture is left in the cell cavity, the wood is said to be at the fiber saturation point. This is also approximately the air dried condition for wood, although when wood is left out-of-doors for a considerable length of time, it will frequently dry to 15 percent moisture content or below.

Wood is dried below the fiber saturation point through the use of a dry kiln. Most hardwoods destined for furniture, flooring, or other interior uses are usually dried to 6-8 percent moisture content. Kiln dried wood must be stored indoors to keep it from absorbing moisture.

The following pages list each Missouri species alphabetically and cover softwoods before hardwoods.

Being able to identify woods is a useful art which should add to your pleasure and appreciation in using and enjoying the woods. Missouri has woods of many types that will not only stir your interest, but also challenge your ability to determine their true identity.

Table 1
Comparative Statistics for Missouri Woods

The following data will be helpful in departing different woods if you are familiar with another wood as a reference point. In some cases, these are “relative” values, as a wood may vary due to the site where it grew.

Species (Common Name)	(1) Specific Gravity (%)	(2) Weight/Cubic foot (lbs.)	(3) Relative Hardness
Ash	.54	41	M
Basswood	.32	26	S
Beech	.56	45	MH
Black Cherry	.47	35	M
Black Gum	.46	35	M
Black Locust	.66	48	H
Black Walnut	.51	39	MH
Black Willow	.34	26	S
Boxelder	.45	34	S
Buckeye	.33	25	M
Butternut	.36	27	S
Catalpa	.38	29	S
Cottonwood	.37	28	S
Cypress	.42	32	S
Dogwood	.64	51	H
Elm, American	.46	36	M
Elm, Red	.48	37	M
Hackberry	.49	37	M
Hickory	.65	51	H
Holly	.50	40	MH
Honey Locust	.60	44	VH
Kentucky Coffeetree	.50	37	H
Maple, Hard	.57	44	H
Maple, Soft	.44	33	M
Mulberry	.59	46	H
Osage Orange	.76	58	VH
Pecan	.60	47	H
Persimmon	.66	51	VH
Oak, Red	.56	44	H
Oak, White	.59	47	H
Red Cedar	.44	33	M
River Birch	.50	40	M
Sassafras	.45	34	M
Shortleaf Pine	.50	36	H
Sweet Gum	.44	34	M
Sycamore	.46	35	M
Water Tupelo	.48	35	M
Yellow Poplar	.38	28	M

(1) Green volume and ovendry weight (data from U.S. Forest Products Lab).
(2) At 12 percent moisture content (data from U.S. Forest Products Lab).
(3) The range of hardness may be: Very Hard (VH), Hard (H), Medium Hard (MH), Medium (M), Medium Soft (MS), or Soft (S).

Contents

Glossary

Annual Ring – annual increment of wood as it appears on a cross-section; same as growth ring.

Bark – the outermost cells on the stem, branches and twigs of trees; these leathery, corky cells have two layers, outer and inner, which are more or less distinct.

Cooperage – in wood products, relates to wooden barrels, either liquid tight or “slack”.

Cross-Section – section of wood cut at right angles to the grain.

Density of Wood – the mass of wood per unit of volume.

Diffuse-Porous Wood – porous wood in which the pores exhibit little or no variation in size, indicative of seasonal growth. See ring-porous wood.

Discontinuous Growth Ring – growth ring formed on only one side of the stem.

Durability – the ability of wood to withstand wood-destroying fungi when exposed to conditions favorable to decay. A prime consideration in the use of wood in some situations.

Earlywood – that portion of an annual ring which is produced at the beginning of the growing season, i.e., springwood.

Figure – generally, any design or distinctive markings on the longitudinal surfaces of wood; specifically, any designs in wood that are prized in use of the wood.

Flat-Sawn – said of wood sawed so that the tangential face is exposed on the surfaces of boards; plain-sawn.

Furrowed – marked with longitudinal grooves.

Grain of Wood – arrangement and direction of wood elements when considered en masse.

Growth Ring – ring of wood on cross-section resulting from periodic growth; if only one growth ring is formed during a year, it is called an annual ring.

Hardwood – wood produced by broad-leaved trees such as oak, elm and ash; same as porous wood.

Heartwood – dead inner core of a woody stem (or log) generally distinguishable from the outer portion (sapwood) by its darker color; see sapwood.

Honeycombing – internal splitting in wood that develops in drying; caused by internal stresses or by closing of surface checks.

Interlocked Grain – grain in which the direction of the fiber alignment alternates at intervals, resulting in ribbon figure when wood is quarter-sawn. Makes wood very difficult to split.

Latewood – the portion of an annual increment which is produced during the latter part of the growing season (during the summer); summerwood. See earlywood.

Mineral Stain – olive and greenish-black streaks believed to designate areas of abnormal concentration of mineral matter; common in hard maple, hickory and basswood. Also called mineral streak.

Moisture Content of Wood – the weight of the moisture in wood, expressed as a percentage of its ovendry weight.

Multiple Ring – a growth ring that contains several false rings within its boundaries.

Nonporous Wood – wood devoid of pores (vessels); same as softwood or coniferous wood.

Plain-Sawn – said of wood so sawn that the tangential face of the wood is exposed on the surface of the boards; same as flat-sawn.

Pore – cross-section of a vessel; a vessel as it appears on the cross-section of wood.

Porous Wood – wood containing pores (vessels); same as hardwood, i.e., wood produced by broad-leaved trees.

Quarter-Sawn – said of wood so sawn that the radial face of the wood is exposed on the surface of boards.

Ray – ribbon-shaped strand of tissue extending in a radial direction across the grain, so oriented that the face of the ribbon is exposed as fleck on quarter surface. See wood ray.

Ray Fleck – a distinct "spotting" created by a portion of a ray as it appears on either the radial or tangential surfaces.

Ring-Porous Wood – porous wood in which the pores formed at the beginning of the growing season (in the springwood) are much larger than those farther out in the ring, particularly if the transition from one to the other type is more or less abrupt; see diffuse-porous wood.

Ringshake – rupture in wood that occurs between increments or less frequently within an annual growth layer; sometimes called wind shake.

Rotary-Cut Veneer – veneer obtained by rotating a log against a cutting knife in such a way that a continuous sheet of veneer is unrolled spirally from the log.

Sap Stains (Blue Stain) – stains in the sapwood caused by woostaining fungi or by the oxidation of compounds present in the living cells, usually blue or black in color.

Seasonal Increment – layer of wood laid down during a given year; see annual growth.

Semi-Diffuse Porous Wood (Semi-Ring Porous) – wood intermediate between diffuse-porous and ring-porous wood.

Shake – rupture of cells or between cells, generally parallel to the growth rings, resulting in the formation of an opening in the grain of the wood.

Slack Cooperage – barrels made for shipment of coarse materials such as nails, nuts, and bolts, railroad spikes, etc. with a plastic or paper lining; may be used for salt, sugar, or other granular products. Called slack to denote that it is not used for liquids of any type.

Softwood – wood produced by coniferous trees; same as non-porous wood.

Springwood – that portion of an annual increment produced at the beginning of the growing season (in the spring); the inner portion of a growth ring; see summerwood.

Staves – curved wood boards joined in circular fashion to form a round container called a barrel.

Straight Grain – grain in which the direction of the fiber alignment is straight or nearly so; grain in which the fiber alignment is vertical or nearly so in the standing tree.

Summerwood – that portion of an annual increment or annual ring produced during the latter part of the growing season (during summer); the outer portion of a growth ring; see springwood.

Texture of Wood – expression that refers to the size and the proportional amounts of woody elements; in the hardwoods, the tangential diameters and numbers of vessels and rays. Expressed as coarse, fine, medium or perhaps grainy.

Tight Cooperage – a term denoting the liquid tightness of wooden barrels. Most commonly applied to whiskey barrels, but also includes pickle and salt pork barrels. Barrels of wood are made with vertical wooden staves held together with metal or wooden hoops.

Twisting – warping in which one corner of a piece of wood twists out of the plane of the other three.

Tyloses – clear, saclike or cyst-like structures that sometimes develop in a vessel, appearing plastic-like, and effectively blocking the passage of liquids. Singular, TYLOSIS.

Vessel – composite, tubelike structure found in porous wood, appearing as a large hole or opening on the cross-section; see also pore.

Warping – any distortion in a piece of wood from its true plane that may occur in seasoning.

Wood Ray – strips of cells extending radially within a tree and varying in heights from a few cells to an inch or more in oak.

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